

WE CLAIM:

- Sub a 3 → 1. A process for cutting a material into pieces having a predetermined target length, comprising the steps of:
- feeding a continuous web of the material from a feed roll to a cut-off module;
 - measuring tension in the web;
 - cutting a piece of the material from the continuous web;
 - measuring an actual length of the piece of material;
 - comparing the actual length of the piece of material to the target length;
- and
- adjusting the tension in the web prior to the web encountering the feed roll in response to any difference between the actual length and the target length.
2. The process of Claim 1 further comprising the step of placing the piece of material on a second web of material.
3. The process of Claim 2 wherein the actual length of the piece of material is measured prior to the piece's placement on the second web.

4. The process of Claim 2 wherein the actual length of the piece of material is measured after the piece is placed on the second web.

5. The process of Claim 1 further comprising the step of placing the piece of material on a conveyor.

6. The process of Claim 5 wherein the actual length of the piece of material is measured prior to the piece's placement on the conveyor.

7. The process of Claim 5 wherein the actual length of the piece of material is measured after the piece is placed on the conveyor.

8. The process of Claim 1 wherein the tension in the web is measured prior to the web encountering the feed roll.

9. The process of Claim 1 wherein the tension in the web is measured between the feed roll and the cut-off module.

10. The process of Claim 1 wherein the step of measuring the actual length includes producing a first signal when the piece is sensed, and producing a second signal when the piece is not sensed.

11. The process of Claim 10 wherein the first signal triggers a device to capture a starting count and the second signal triggers the device to capture an ending count.

12. The process of Claim 11 wherein the device determines a total number of encoder counts and converts the number of encoder counts into the actual length.

13. The process of Claim 12 wherein a non-zero difference between the actual length and the target length triggers the tension adjusting step.

Sub claim
14. The process of Claim 1 wherein the tension-adjusting step includes the step of modulating the web tension to a minimum.

15. A process for cutting a material into pieces having a predetermined target length, comprising the steps of:

feeding a continuous web of the material from a feed roll to a cut-off module;

measuring tension in the web prior to the web encountering the feed roll;

cutting a piece of the material from the continuous web;

measuring an actual length of the piece of material;
comparing the actual length of the piece of material to the target length;
and
adjusting the feed roll's speed in response to any difference between the
actual length and the target length.

16. The process of Claim 15, further comprising the step of
maintaining the web tension at a minimum immediately preceding the feed roll.

17. The process of Claim 15 further comprising the step of placing
the piece of material on a second web of material.

18. The process of Claim 17 wherein the actual length of the piece
of material is measured prior to the piece's placement on the second web.

19. The process of Claim 17 wherein the actual length of the piece
of material is measured after the piece is placed on the second web.

20. The process of Claim 15 further comprising the step of placing
the piece of material on a conveyor.

21. The process of Claim 20 wherein the actual length of the piece of material is measured prior to the piece's placement on the conveyor.

22. The process of Claim 20 wherein the actual length of the piece of material is measured after the piece is placed on the conveyor.

23. The process of Claim 15 wherein the step of measuring the actual length includes producing a first signal when the piece is sensed, and producing a second signal when the piece is not sensed.

24. The process of Claim 23 wherein the first signal triggers a device to capture a starting count and the second signal triggers the device to capture an ending count.

25. The process of Claim 24 wherein the device determines a total number of encoder counts and converts the number of encoder counts into the actual length.

26. The process of Claim 25 wherein a non-zero difference between the actual length and the target length triggers the feed roll speed adjusting step.

27. Apparatus for producing discrete pieces of material of a target cut length, the apparatus comprising:

an unwind spindle from which a continuous web of material is fed;
a cut-off module, wherein a discrete piece of material is cut from the continuous web;
a feed roll between the unwind spindle and the cut-off module;
a device for measuring tension in the web; and
a detection system for measuring an actual length of the discrete piece of material.

28. The apparatus of Claim 27 wherein the feed roll has an adjustable speed.

29. The apparatus of Claim 27 wherein a level of tension in the continuous web at the unwind spindle is higher than a level of tension in the continuous web at the cut-off module.

30. The apparatus of Claim 27 further comprising a dancer roll between the unwind spindle and the feed roll.

31. The apparatus of Claim 30 further comprising a web guide between the dancer roll and the feed roll.

32. The apparatus of Claim 27 further comprising a transfer device between the cut-off module and a second web of material.

33. The apparatus of Claim 27 further comprising a transfer device between the cut-off module and a conveyor.

34. The apparatus of Claim 27 wherein the detection system comprises an automatic registration and inspection system and a line shaft encoder.

35. The apparatus of Claim 27 further comprising a proportional integral derivative control system operatively attached to the feed roll.

36. The apparatus of Claim 27 further comprising a proportional integral derivative control system operatively attached to the unwind spindle.

37. The apparatus of Claim 27 further comprising at least one driving device between the unwind spindle and the feed roll, wherein the at least one driving device is operatively attached to a proportional integral derivative control system.

38. The apparatus of Claim 27 wherein the device for measuring tension in the web measures tension in the web between the unwind spindle and the feed roll.

39. The apparatus of Claim 27 wherein the device for measuring tension in the web measures tension in the web between the feed roll and the cut-off module.